

Momentum

1. Question & Research Task

The human body is designed to survive bumps, bruises and impacts of all kinds. Athletes, however, repeatedly receive hits and blows to the head and body. This leads to several momentum-related injury questions:

- **How are athletes' bodies affected by the force?**
- **Does the momentum of the force causing injury affect the injury's severity?**
- **How is Newton's Law of Motion applied to a collision that results in injury?**

Review Newton's Law of Motion by viewing the resources below.

- [Momentum](#)
- [Newton's Laws of Motion](#) (review the second law)
- [Key Vocabulary List](#)

In this Slam Dunk, you will conduct brief, focused research to respond to the inquiry question:

How is momentum involved in sports related injuries?



Image Source: Pxhere

2. Information Sources

Choose several of the information sources linked here to complete the Student Activity on Slide 3.

Football and Boxing are two sports in which athletes receive frequent blows to the body and head. The resources listed below focus on the science behind the sports and injuries. Pay close attention to:

- causes of injuries
- momentum and impact on injuries
- Newton's Law of Motion

Digital resources:

- [Football Physics: The Forces Behind Those Big Hits](#)
- [Football: Mass, Momentum, and Collision](#)
- [How the Physics of Football Works](#)
- [Momentum and Its Conservation- Boxing Punch](#)
- [Penn State University Physics Behind Boxing](#)
- [Video: Face Punch](#)



Image Source: StockVault

3. Student Activity

Use the sources on Slide 2 to gather and organize information about the correlation between momentum and sports-related injuries. Use [this Google Doc](#) to record information about the three questions on slide one:

- How are athletes' bodies affected by the force?
- Does the momentum of the force causing injury affect the injury's severity?
- How is Newton's Law of Motion applied to a collision that results in injury?

Then collaborate with a partner to share the information gathered and to discuss the correlation between momentum and sports-related injuries.



Image Source: rawpixel

4. Assessment Activity

How is momentum involved in sports related injuries?

After you have gathered and highlighted your research notes, circle the information that supports your answer to the inquiry question above. You will need this information to form and record your response in [VoiceThread](#) (scroll down until you find this app).

Type or write out your response before recording. Be sure to support your answer with information gathered from the provided resources.

When complete, record your response (voice, type, or video) in the VoiceThread assigned by your teacher. You will need to log-in first. Click on the screenshot at the right to access the VoiceThread template. If you want to use this template, click on “make a copy” from the drop-down menu on the top left part of the screen.

How is momentum involved in sports-related injuries?



Click on the image to go to the sample VoiceThread.

5. Enrichment Activities



Image Source: pXhere

Create a poster or Infographic identifying the correlation between momentum and sports-related injuries. Focus the poster on informing future athletic trainers about the science behind sports-related injuries.

Resources to create a poster or Infographic:

- Google Slides
- PowerPoint
- Publisher
- Sway
- [Science Buddies-Science Careers: Athletic Trainer](#)

6. Teacher Resources

Learning Standards Alignment

Content Learning Standards
[Next Generation Science Standards](#)

HS-PS2-3 Apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision

[MCCR ELA Standards for Grades 9-12](#)

Reading: 1. Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

Writing: 7. Conduct short as well as more sustained research projects based on focused questions, demonstrating understanding of the subject under investigation.

[AASL Standards Framework for Learners](#) Inquire: Build new knowledge by inquiring, thinking critically, identifying problems, and developing strategies for solving problems.

Think: Learners display curiosity and initiative by:

I.A.2 Recalling prior and background knowledge as context for new meaning.

Create: Learners engage with new knowledge by following a process that includes:

I.B.1 Using evidence to investigate questions. I.B.3 Generating products that illustrate learning.

Share: Learners adapt, communicate, and exchange learning products with others in a cycle that includes:

I.C.1 Interacting with content presented by others.

Grow: Learners participate in an ongoing inquiry-based process by:

I.D.2 Engaging in sustained inquiry.

[P21 Framework: 21st Century Student Outcomes](#)

3. Information, Media & Technology Skills: Information Literacy: Access information efficiently and effectively; Use information accurately and creatively for the issue or problem at hand.

ICT Literacy: Use technology as a tool to research, organize, evaluate and communicate information.

SLIDE NAVIGATION

1	2	3	4	5	6
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Grade 11 Content Area: Science Unit: Newtons Law’s

Time Frame: One 90-minute class period

Notes to the teacher:

- Collaborate with your school library media specialist to plan and implement this lesson.
- Provide students with login information as needed to authenticate BCPS Digital Content. Login information is on the **BCPS Digital Content** page in the [Apps Portal](#).
- Consider using the [Schoolology Assignment App](#) feature to assign Google Docs for students to access, edit, and submit through Schoolology.
- **Slide 4:** Use [this resource](#) for instructions on how to copy the VoiceThread and assign it to your classes through Schoolology.